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ABSTRACT

Reported are the results of instructional development projects at Utah State University, funded under mini grants, faculty development grants, or developmental grants to departments. These projects involve redesign of courses in media production, library resources, pattern design and fitting, counselling psychology, quantitative methods, sociology, reading, accounting, fluid mechanics, materials science, soil mechanics, and wildlife science. Individualized approach and media presentation are used in most courses. Comparative data of the alternative instructional method and original method and student feedback are included in this report. It concludes that despite limitations in evaluation design, substantial results in both student achievement and student attitude have been demonstrated, and faculty involvement in various projects is meaningful. (Author/SC)

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SO WHAT'S DIFFERENT?

STUDENT ACHIEVEMENT AND ATTITUDE RESULTS FROM INSTRUCTIONAL DEVELOPMENT PROJECTS

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ABSTRACT

Nationally, attempts to measure impact of instructional development (I.D.) on student achievement and attitudes are rare v

This report sets out to document the impact of I.D. efforts at U.S.U. through specific results from individual projects funded under mini grants, faculty development grants, or departmental development grants. 1

A limitation of these studies is the lack of complete control over intervening variables inherent in research with human subjects. None of the studies are flawlesss from an experimental standpoint. However, each attempts to provide valid data through the most feasible means available. 3

These studies have generally involved faculty in the planning and conducting of the studies. Faculty involvement is felt to stimulate the use of the study's findings, a major advantage of this approach 4

Minigrants (up to $500) are given to encourage modest projects initiated by faculty members. While evaluations of these are generally sketchy, in three cases, extensive evaluation has been conducted. . 5

(1) IM 551: Production of Media Materials. The lecture demonstration method was compared with three variations of instructional television (ITV) presentations. The only significant difference noted on several measures of attitude and achievement was found in the significantly lower attitudes expressed in one fairly unstructured class using the experimental ITV approach. 5

(2) History 300: Sources and Literature of History and the Social Sciences. This minigrant sought to infuse interest into a class requiring extensive work with library resources. A measure of student attitudes upon completion of the course showed partial success in overcoming the stereotype of a boring class. Students saw the self-instructional modules as a significant improvement. 9

(3) HECE 260: Pattern Design and Fitting. Two modules involving slide/tape presentations and clothing fitting experiences were compared with the previous method of demonstration instruction. Students performed equally well under the new approach, reaching the required criterion level, and expressed sentiments favorable to this method. 11

Faculty development grants, generally involving the released time of the recipient, allow for more extensive development work and more thorough evaluation efforts than is feasible for minigrants. 14

(1) Counseling Psychology: Observational and Recording Skills in Behavior Modification. This approach using slides, cassette tape and a workbook was demonstrated to be effective in presenting material; however, it was not compared with any other existing method. Student feedback characterized the approach as interesting, valuable, and efficient. 14

(2) B.A. 601: Quantitative Methods for MBA Students, These modules were developed for self-instruction in prerequisite skills for MBA students. The information gathered to date indicates (1) the completion rate of those who register and take at least one exam is higher for on campus students (63.2%) than for those off campus (58.1%). Achievement under the modular approach has not been compared formally with the classroom approach 15

(3) Soc. 101: Introduction to Sociology. The revised lab sessions, conducted by graduate students, showed considerable variation depending upon the graduate assistant. Student opinion regarding the lab sessions was tracked over three quarters but did not indicate major impact from this project. 17

(4) Sec. Ed. 610: Improvement of Reading in Secondary Schools. As a prelude to course changes, two studies of reading were conducted. The results suggested that (1) Utah students read considerably less on an independent basis during high school than during junior high years, and (2) experts in the field see the teaching of skills in study skills and reading comprehension instruction as priority items for secondary teachers. Two self-study modules were developed as a supplementary, alternative approach to this material for teachers. While both modules were found to teach the material to a specified criterion level, only under the first were students found to perform as well as the traditional lecture approach. Student achievement under the second module was found to be significantly lower than the previous method, indicating a need for revision. 19

(5) Acc. 561: Accounting Theory Both a minigrant and a faculty development grant were involved in this project to integrate current pronouncements of accounting standards into existing curriculum. Four developments were noted: (1) a statewide survey of accounting teachers found widespread disregard for these pronouncements, leading to (2) a nationwide study of members of the association which found widespread acceptance for the integration of this knowledge into the existing curriculum rather than creating new courses to teach it. (3) An increasing awareness of this information has been found among

incoming students, indicating greater attention being paid by other professors in the department to these pronouncements; and (4) the accounting theory course has been redesigned and demonstrated more effective in the final version than in the first draft stage. 21

One major thrust of Instructional Development efforts has been involvement at the departmental level. The two departments involved in these efforts thus far have been Civil Engineering and Wildlife Science. 25

(1) CE 350: Fluid Mechanics. This course was developed using a self-paced, modularized approach as one of the first faculty development grants given. When compared with students in a lecture presentation, students under this method performed equally well on a test of problem solving skills (open book test) and performed significantly better on a test of concept learning (closed book test). 25

(2) ME 415: Materials Science. Twenty-five self-instructional slide tapes were developed as a basis for this class. On comparisons of student achievement and attitude, the revised course demonstrated superiority over the previous lecture method 28

(3) CE 430: Soil Mechanics. With the cooperative efforts of three professors in this field, a new textbook in Soil Mechanics was developed. Supplemented with a series of overhead transparencies and a revised course sequence, the new course gets high marks for instructor enthusiasm and student attitude. The finding of significant jump in enrollment over previous years in the next class in this sequence (an elective) has been interpreted as an indicator of higher student interest. 31

(4) WS 390: Game Birds and Mammals. Developed by a professor and two graduate students, this individualized instructional booklet was supplemented with color slides to teach three weeks of the course material. A comparison of mid-term results, admittedly over different material, but with exams of equal difficulty suggests that students avhieve at least as well using the new format. Student opinion toward the approach was favorable. 32

The study concluded that, despite certain limitations, substantial results in both student achievement and student attitude have been demonstrated for a number of ID projects. Multiplying these gains by many students over a number of quarters shows a potentially sizeable impact upon students. 37

FOREWORD

Instructional development at Utah State University has attempted to engage faculty members in fairly modest development projects with maximum involvement. What has been accomplished thus far? To what extent are the changes documented?

Evaluation studies in the field of instructional development are rare at present. Gaff (1975) notes that "promoters of instructional improvement programs have been too busy getting things in motion to worry about evaluating what they are doing" (p. 161). To some extent, this observation is applicable to USU; however, in the past two years, with funding from the Fund for the Improvement of Post Secondary Education (FIPSE) considerable effort has gone into providing evaluative data for program decisions.

A previous report entitled "ID Under the Microscope" dealt with faculty perceptions of the instructional development program. This report deals with impact upon students, specifically with changes in attitude or achievement as a result of I.D. involvement. Not all projects have been of the type to allow such documentation, but where available, such data have been reported.

Appreciation is expressed to the faculty, students, and staff who assisted in the gathering or processing of information.

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I. INTRODUCTION

The goal of instructional development from the standpoint of the center at Utah State University is one of continuing insitutional renewal. The outcome of such renewal can be assessed in a number of areas. This study cites evidence in two such areas: (1) in student achievement, and (2) in student attitude toward the learning environment. Measurement in the two areas is certainly interrelated, although the relationship is not always direct and simple. For example, if improved instruction boosts achievement the student's attitude toward the course may improve. Conversely, poor instruction can frustrate the learner and lead to negative attitudes toward the course and toward his own abilities. However, a number of faculty members have expressed misgivings about viewing student attitude alone. First because of concern that a more demanding class may not be viewed favorably by many students, and secondly, because appreciation for a course may change over time. None of the studies reported herein attempts to document attitude toward a course longitudinally, over a period of time, although such data collection is planned for future studies. Whenever possible, however, an attempt has been made to examine both attitude and achievement results and thereby obtain a more valid composite picture of the course.

In conducting these studies, an attempt is made to divorce the evaluation from considerations of teacher personality and style to focus upon more impersonal factors such as course organization, content, and instructional technology employed. This approach suits both the style of the USU center, which deals more with "instructional products rather than teaching skills" (Eastmond, 1975c, p. 29), and also helps to make the studies less ego-threatening to the faculty member. To be sure, faculty members are bound to be ego-

involved with the course they helped create, but by examining the course from an impersonal viewpoint, less defensiveness and more constructive outcomes can be fostered.

This study emphasizes numerical scores or "hard data" in both achievement and attitudinal analysis, recognizing that a portion of the reality of the teaching/learning process is not captured by this approach. While anectdotal and hisorical types of data are kept, this report focuses on an interpretation of quantifiable data. Thus, the role of the evaluation reported herein is to systematically collect and process varieties of data to document the impact of instructional change.

The aim in conducting such a study is to involve faculty members extensively in both the I.D. process and in the evaluation of their revised instructional product. Consequently, evaluation data are collected in diverse ways to meet the professor's needs and desires. If he is interested in assessing the attitudes of his students toward new methods incorporated into a course, we work with him to develop the necessary measures. The instrument used asks whatever the professor wishes to know presumably providing both the formative and summative evaluation information. Typically, the ID office will administer the measure, analyze the data, and help interpret the results with the faculty members involved. If warranted, changes can be made in whatever "product" or "teaching method" is being assessed.

While some limited evaluation is possible with the minigrant program (funded at less than $500), faculty development grants involving faculty released time offer the chance to use more sophisticated designs in collecting evaluation data. After the planning stage is completed, it is possible to continually evaluate progress toward the original objectives. The student and/or faculty questionnaire to assess attitude is again appropriate. But, furthermore, quasi-experimental research designs allow assessment of changes in student achievement. Such designs are considered quasi-

experimental (Cambell and Stanley, 1963) since the sample is generally composed of the existing class rather than a randomly chosen group. Ideally, the steps in implementing one such design would be: (1) During the first or planning quarter of a faculty development grant, while the professor teaches the course using the traditional approach, baseline student attitude and achievement are measured. (2) During the second quarter, the professor develops the new course. Hopefully, his new course plan would include plans for all measures to be comparable to the original measures. (3) During the third quarter, while teaching the new course, attitude and achievement of skills are again measured. Some means of equating the original groups--either through a pretest measure or entering GPA--is desirable.

As will be apparent in the specific case studies that follow, a variety of experimental designs and evaluation instruments have been used. From a practical standpoint, extensive involvement in evaluation research depends upon initiative for the evaluation coming from the faculty member. Without his support, the effort will likely be viewed as an imposition and the results will often be ignored.

The same philosphy guides both the ID process and the evaluation efforts at USU. A faculty member will find a process useful when he participates and contributes his own ideas. He will find the process useless or imposing if he does not. This finding is true of whole departments. The limitations and problems involved in collecting "hard data" stem from such an operating philosophy. Many times a professor who has developed a new course or changed only part of a course is reluctant to assess either student attitude or achievement. The course is his property; he may fear the outcome of evaluation with its possible negative implications. Course redevelopment involves not only changed teaching methods, but sometimes deleted or changed content. Exams for the new course may assess more difficult skills. If

the course content changes dramatically, collecting comparable achievement data on a final exam is virtually impossible given present resource constraints. Therefore, we find we must employ whatever techniques are of most use to accomplish a methodologically sound and acceptable evaluation for the faculty member. If such an effort appears threatening to the client, we purposely back off rather than abort the mission. The following section describes projects where such data were collectable and could be summarized. Both positive and negative findings are discussed, but a word of caution is in order.

Data are used in social science research to "provide explanations." However, the necessity for the researcher to interpret the data and to draw conclusions should not be forgotten. Reality is extremely complex, the effects of various factors and their interactions are manifest in ways far too complex to be understood with the rather basic tools--statistical and otherwise--employed in the relatively simple research designs described below. The point is made simply to put these techniques into perspective. Moderate attempts at controlling intervening variables have been made. However, such attempts generally represent relatively rough cuts at describing a project's effectiveness.

While the limitations are evident, so too are the strengths. Each of these projects was evaluated with the cooperative effort of the faculty member developing them and the ID evaluation staff. The results from these measures do not go unheeded: clients generally take a hard look at the results from their projects and make needed revisions.

Projects are described individually and results reported, both positive and negative findings. Where possible, the most important factors involved are mentioned with the aim of explaining the observed phenomena. Projects proceed from the simpler to the more complex, from mini grants to faculty development grants to departmental development work.

II. RESULTS OF SELECTIVE MINI GRANTS

Following the building of awareness of the Instructional Development Center's existence on campus, small grants ranging from $200 to $500 are offered to all faculty members. Called "Mini Grants", these relatively small outlays of money are useful in encouraging innovation among faculty members, to try out ideas the person has always wanted to do. In higher education, the grant has specific social value. A professor who receives a grant achieves an immediate status reward (DeBloois and Alder, 1973). At the same time he must commit himself to the output required to fulfill the grant requirements. Each mini grant asks that the recipient invest his time in designing learning strategies to improve instruction, i.e. for part or all of a course. Included, to a greater or lesser degree depending on the project, are I.D. consultation and guidance on problems such as media production, testing, and evaluation.

It has been recognized that, given the limited resource commitment, no extensive evaluation effort is generally warranted. The three projects described below represent exceptions in that it was important to the client to obtain results regarding the project. Keep in mind, however, that over one hundred such projects have now been completed and that the three reported below are somewhat atypical of the majority, i.e. considerably more data were gathered.

Instructional Media 551: Production of Instructional Materials

During winter quarter, 1975, the Instructional Media Department at Utah State University received a mini grant for $500, awarded through the Division of Instructional Development. The purpose for the project was to develop

a series of 24 video tapes for course IM 551. Particularly important for this class was the demonstration of fairly elaborate techniques which had to be set up and taken down for each class previously. The aim was to save instructor time during demonstration which could then be used for individual lab work with students.

An extensive evaluation of alternative methods of presenting the course was conducted with three sections of the course during spring quarter, 1975, and then an additional follow up trial during fall quarter. The three sections were structured as follows:

Group 1: Beutler's Experimental: Students had no scheduled class time, but instead, viewed video taped class presentations at their convenience. While a regular lab period was scheduled especially for this class, additional evening lab sessions were available. The regular course instructor was used to conduct the section.

Group 2: Beutler's control. Students received a class lecture/demonstration but did not view the video presentation. A lab period was scheduled. A regular course instructor conducted the section.

Group 3: Hambelton's Experimental. Students saw the video taped presentation as a class and then proceeded to a lab period. The option of making up a missed presentation was available during the following class's lab session. An advanced graduate student teaching assistant conducted the sessions.

Group 4: Smellie's Experimental. Students viewed the video content presentations prior to class and were required to attend lab sessions. The instructor was available during this time

for questions or assistance. Projects were required to be turned in on pre-set deadlines, i.e. a definite pacing system for student work was employed.

The experimental design employed in this research is called a "Non-equivalent Control Group," as described by Campbell and Stanley (1966). Basically, the design used three experimental groups and one control group made up from pre-existing groups, in this case students who signed up for the course at a particular hour (9:30 or 11:30 a.m.).

While this procedure does not employ randomization in assigning subjects to groups, a random method was employed to designate experimental and control groups.

Based upon the minimal differences between groups on a pretest of knowledge of course content, it was felt that groups could be considered equated on entering knowledge. Therefore, a simple one-way analysis of variance statistical comparison was used. The independent variable for various ANCOVA comparisons were the scores on particular tests (pre-test or post-test) and total accumulated points for the course. Results of the pretest and post-test of course content given to groups 1-3 demonstrated no significant differences between the groups.

Twelve projects were required for this course from every student. The total of these points was used to assign a student's grade. It should be noted that scoring was done in reverse order, i.e. better performance is shown by a lower score. Table 1 shows these results for the three groups.

TABLE 1:
Comparisons of Total Project Scores, IM 551

	Beutler's Experimental	Beutler's Control	Hambleton's Experimental	Smellie's Experimental
$\bar{x}$	187.73	172.28	172.25	181.70
S.D.	31.56	43.86	28.03	30.57
n	11	18	12	20

There are no significant differences across groups on this measure (F = .633; df 3, 57)

For the measure of attitudes, no pre-test of attitude was administered, as the questions asked are clearly appropriate only after some exposure to the course. The findings of the Analysis of Variance for these scores, unlike the previous three measures, do show significant differences (F=14.05, df). Table 2 summarizes the observed differences. A comparison between means shows all groups to be significantly higher than Beutler's Experimental section:

TABLE 2:
Comparison of Attitudinal Meausures, IM 551

	Beutler's Experimental	Beutler's Control	Hambleton's Experimental	Smellie's Experimental
$\bar{x}$	56.08	74.88	70.23	74.95
S.D.	11.70	8.06	10.10	6.48
n	13	17	13	19

None of the other sections differ significantly, i.e. the differences could just as well be due to chance. (F=14.05, df 3, 58)

Examining the specific items on the attitude measure, it is apparent that students were uncomfortable with "getting motivated to do what had to

be done" and in the lack of personal contact with the instructor. These findings were corroborated by the number of students who dropped out after the first class period and by the number of students who took grades of "Incomplete." In both cases, the numbers were more than double that of the other classes.

From these findings, it was not possible to conclude that either the lecture or the videotape approach was more effective than the other. In none of the four tryout cases was achievement significantly different. In only one of these did student attitudes differ significantly. These results clearly indicate a need for classroom structure, packing, and individual contact with the instructor. At this point, any differences in effectiveness between the two approaches, video vs. lecture, are not apparent.

History 300:
The Sources and Literature of History and the Social Sciences

This course was intended to prepare a student with library information retrieval skills for graduate research or the teaching of history. The prevailing attitude toward the class, held by both students and faculty, had tended to label it as a necessary evil, a required set of library skills which could only be obtained through painful and laborious experience. One aim of Dr. Alder's course revision, using a mini grant and staff support from the ID office, was to use a set of novel techniques to get the required message across and thereby upgrade the image of the course. A second aim was to individualize information dissemination to thereby allow class time for group activities. While the time open in class has been decreased, the student advisement hours have reportedly increased considerably.

Additions to the course included a 70 page workbook, an audio-tape library tour, ten slide-tape modules, a filmstrip and one computer assisted instruction lesson. All but the last two of these were developed during

the mini grant. Students were assigned to work independently, turning in an assignment at the completion of each unit, with one formal class meeting per week and the instructor available for individual advisement.

The revisions were made during the fall and winter quarter, 1975-76, with the course implemented during spring quarter. A survey of attitudes toward the course was administered at the end of the quarter. No measure of achievement was attempted.

Strong points identified about the course were (1) that the modules were a significant addition to the course; (2) that formal meetings once per week were adequate, given the self-paced modules; and (3) that students likely would not have learned the material as well without the effort of the performance-based test. On the semantic differential portion of the questionnaire, the course was characterized as being "necessary," "good", "useful". It was also seen as "unusual", "imaginative", and "up-to-date".

Some points made in the questionnaire suggest that much of the stereotype of the course was only partially overcome. For example, there were mixed feelings about the time required for the library tour being excessive and the amount of repetition of course material. The same kinds of mixed reactions were apparent for the semantic differential, with virtually a neutral mean position for "Boring vs. Interesting", "Meaningful vs. Busywork" and "Unpleasant vs. Enjoyable". Apparently, the stereotype still holds to some extent, at least for certain students.

Some additional points suggest possible areas for course revision. Students noted uncertainty at times about what was required. Seven students noted equipment malfunctions with the recorder during their tour, while others were reasonably satisfied here. Future revisions are anticipated to strengthen the modules; however, these will likely not be extensive in the near future.

Home Economics and Consumer Education 260: Pattern Design and Fitting

During the 1975-76 school year a mini grant was awarded to Jean Alder of the Department of Home Economics and Consumer Education to develop portions of a course in Pattern Design and Fitting (HECE 260). Annette Fraser, a masters degree candidate, using the R&D approach, worked closely with the ID staff to develop two modules for this course, this effort forming the basis for her masters degree work.

The modules were as follows:

1. "Five Factors of Fit," consisting of a 17 minute slide-tape presentation dealing with the principles and standards of clothing fit. Designed for use on a self-instructional basis, it can also be used in a group setting.

2. "Fitting Phenomena," is a seven minute slide tape presentation and is completely self-paced. This module incorporates student participation in the fitting of a standard garment on a half-scale replica of a deviant figure. Time required for completion varies with the student, generally from 35 to 75 minutes.

Evaluation of the modules was done with 15 people who had already taken the course in previous quarters, sometime within the previous nine quarters. The average time since course completion was 3.8 quarters for this group. The average age of this group was 21.8 years at the time of course evaluation.

These people were contacted by phone and asked to participate in an experiment. They were scheduled to work through the modules in groups of three. Appropriate questions selected from the fitting test used in the HECE 260 class were used as a Pretest and Post-test. The individual test papers--kept on file by the department--were rescored to determine how well the subject had performed in that content area when they originally took the course. Then randomly, the pertinent questions were divided up into the pretest and post-test, each weighted to have an indentical maximum score with the original portion of the final test. Thus, a com-

parison of achievement was possible at three points in time: (1) when students originally took the course; (2) at pre-test time, with no review; and (3) following module completion. In addition, students were evaluated on module success by a criterion based (mastery) test which required that 100% of the students reach 80% of the objectives. All students met this goal. Statistical information was used to back up the study. Participants were also asked to complete a short questionnaire dealing with feelings toward the module. The time required to complete the second module was recorded (average: 55 minutes), but no comparison with the previous time required was possible.

Results

On the test of achievement, subjects averaged highest on the original class test (23.87), dropped considerably over time as measured by the pre-test (19.00), but improved considerably for the post-test (22.27). Statistically, the pre-test results were significantly different ($p<.05$ level) from the other two tests, but the final test and the experimental post-test did not differ significantly. From this finding, one can conclude that the module teaches course content to a level equivalent to that previously attained in the class. While one would expect previously learned material to be learned somewhat more rapidly (Travers, 1972), situational factors were probably more favorable in the previous classroom environment and thus may balance out the relearning aspect.

Results on the opinion measure were favorable toward the module. Particularly for the three questions dealing with module desirability, responses were highly favorable, averaging 4.7 on a five point scale. Specifically, these questions assessed attributes toward (1) the option of repeating the content presentation; (2) the convenience factor of individual use in the classroom; and (3) whether these modules would be rated as a "worthwhile

addition" to the class. Thus, while resulting in equivalent achievement on a test of course content, these two modules were viewed favorably by students and represent, at least from a learner's point of view, a significant and worthwhile addition to the course. The evaluation design, using a retrospective analysis of student test scores, is unique among the set of evaluations reported herein and is quite ingeniously convincing. From the point of view of the ID Center, this project represented the successful use of a capable graduate student as an intermediary between ID staff and the HECE faculty member.

III. RESULTS OF DEVELOPMENT GRANTS TO INDIVIDUAL FACULTY

Faculty Development Grants involve an important change in emphasis from that of minigrants. Besides designing learning strategies for a course, the professor must become personally involved in the instructional development process. Competitive Faculty Development Grants of $1,5000 to $4,500 are offered to accomplish this. A Faculty Development Grant requires that a professor spend one quarter of his/her own time in planning a total course with the Instructional Development personnel. The planning quarter is followed by a quarter of released time, during which I.D. personnel assist the faculty member in the actual development of materials. Finally, during the third quarter, which should be the concluding quarter, the redesigned course materials are tested and evaluated as they are used in the instructor's classroom. However, due to personal needs, the pattern for carrying out a Faculty Development Grant may vary. For example, a number of recent grants have involved graduate students as well as faculty members in carrying out the work. Generally, during the released-time quarter, the department involved provides half of the professor's salary while the Instructional Development Division provides the other half. Since other professors must accept responsibility for the grant recipients classes for this time, it is important that the whole department initiate and support the change effort.

Counseling Psychology: Observational and Recording Skills in Behavior Modification

Partial funding by the Division of Instructional Development formed the basis for a multimedia program for teaching observational and recording skills. Two doctoral candidates, Gerald D. Hecker and Darlene L. Adams, Carried out the development and validation of the program as a basis for a joint dis-

sertation. The results of their research form the basis for an evaluation.

The program consisted of two slide carousels (192 slides) with accompanying cassette tape and workbook, as well as three 8 mm cassettes with accompanying manual and monitor's guide. Program effectiveness was tested using a post-test only control group design, with 40 subjects assigned randomly to both experimental and control groups. The experimental group received the instruction prior to taking the post-test; the control group did not. The comparison was then made between the post-test performance of one group who had received instruction and a second group who had not. Subjects also completed a questionnaire about the program.

The findings were of significant differences between the experimental group ($\bar{x}$=218.15) and the control group ($\bar{x}$=84.55) at the $p<.001$ level. In addition, a student feedback response form showed the multimedia approach as being "highly interesting", of value to students, and an efficient way to present this material.

The conclusion of effectiveness in instruction was drawn from these data. The question of relative effectiveness, this approach in comparison with another approach, was not asked. Thus, while one may conclude that this approach works, one has no information to conclude its superiority or inferiority to that of a more traditional approach (e.g. a lecture method or a programmed text).

Business Administration 601/602: Quantitative Methods for MBA Students

Based upon work done under a faculty development grant by Dr. Allen D. Karchner, a self-study program of quantitative methods was begun in winter quarter, 1974. Four subjects are available: linear algebra, calculus, statistics, and operations research. The program was designed to appeal to three potential audiences (1) entering MBA students who had done

comparable undergraduate work and who wished to "test out" of the requirement; (2) students who wished to work independently and at their own rate; and (3) students who are off-campus and thus unable to attend classes without considerable difficulty.

To date, no definitive study has been done to compare achievement scores of students using this method as compared to those students who take regular course work. However, considerable data are available to evaluate the program through indirect means, such as completion rate and profile of non-completers. These findings give an indication of the type of student who can be expected to complete the program.

After two years of operation of the program, on-campus registration has averaged 12 students per quarter with an average of 19 credit hours granted. Average off-campus registration has been 9.6 students per quarter with an average 10.3 credits awarded.

Of the approximately 600 exams which have been administered, 51.8 per cent have been graded at the A level (88 or above), 33.5 per cent have been at the B level (77 to 87), and 14.7 percent have not been passing (below 77). The overall rate of completion of the course is 61.3 per cent of those who register for the course and take at least one exam. Students taking the course on campus have a greater probability of completing than those registered off-campus through the various extension centers, 63.2 per cent as opposed to 58.1 per cent. This is understandable as there is less opportunity for contact with the instructor and many students in this situation have not made the commitment that an on-campus student has. In fact, it would seem somewhat surprising that only 5 percentage points separate the two completion rates. Of those that complete, about two-thirds finish during the quarter of registration.

Some additional findings of interest are that (1) the percentage of repeat exams--for the purpose of raising the grade--is greater for on campus students, 15.3% as opposed to 8.1% for those off-campus; (2) almost half (47.7 per cent) have registered for modules in more than one area during a quarter; and (3) about 7 percent of the exams taken so far occurred during quarter breaks, indicating an increase in flexibility of options.

These data are of the type generated by a well-kept management information system, which Dr. Karchner has carefully maintained. The finding that many students do complete--68 to date--is counter-balanced by the finding that many do not, particularly if the substantial number who took no exams is included. When all students who have registered are considered, over half (55%) will not be expected to complete. Further study might determine the motivation or selection factors which operate in this case.

Sociology 101: Introduction to Sociology

Citing the problems of individual student contact with the instructor for a large survey class, Dr. Bradley Parlin proposed to redesign the lab sections of the introductory sociology course, using a modular approach. Originally, eight such modules were to be developed. As things turned out, three modules were eventually completed. These involved mainly adaptations of existing materials to produce slide-tape modules and a student workbook covering the three units.

The evaluation of this effort consisted entirely of student opinion data, gathered through a questionnaire, toward the lab sections. Student opinion was solicited during spring 1975 regarding the previous lab instruction method. These findings were contrasted with the revised method employed fall quarter. Then, suspecting that some of the observed differences were due to lab instruc-

tor personalities, a final questionnaire was given, with the results analyzed separately for each instructor.

The following conclusions were drawn from the three questionnaires given:

1. There were significant differences between instructors as perceived by students, as to their knowledge of the subject, their ability to respond to questions, and their personal involvement with students.

2. The same kinds of differences in student attitudes were apparent in opinions toward the modules. However, regarding the overall lab experience, few differences of significant proportions were noted.

3. Data suggested positive affect toward clarity of module objectives and examples in the text. There was reasonably positive feeling toward the usefulness of the modules as an addition to the course.

4. In comparisons involving total class means, several instances of regression toward the mean were noted for previously significant differences. For example, item number one dealt with the degree to which the lab instructor came to know the students on a personal basis. Results from the previous two quarters had shown significant differences in favor of previous method. However, the winter quarter mean for that item fell between the previous two means. Similar results were apparent for five other items.

5. One item of particular concern was an item which asked students to rate this lab experience in comparison with previous lab experiences. Students consistently rated the previous method significantly higher than the revised approach.

6. Where the fall and spring comparisons showed various items higher than others for each approach, the winter comparisons were uniformly significantly lower than either the fall or the spring comparisons.

From the standpoint of the ID office, the changes brought about were relatively minor--three of the eight original modules--and these were of questionable merit as judged by student feedback. No comparisons of achievement under the two methods were attempted, as the test changed considerably from quarter to quarter. The contact between the ID office and the professor was minimal in this case, and, judging from the available data, the changes in the lab portion were not major. The considerable data available do not demonstrate major impact from this grant.

Secondary Education 610: Improvement of Reading in Secondary Schools

Recognizing that a major difficulty faced by high school students involves inadequate reading skills, this course was originally developed to train secondary teachers, regardless of subject matter expertise, in techniques of teaching reading. The course was made a requirement for all secondary education majors.

Under a faculty development grant to Dr. William Strong, this course was revised extensively. Lila Phillips, a doctoral candidate in the department, worked to develop two modules which could be incorporated into the existing curriculum. These modules were meant to provide a self-directed alternative to the regular lecture course. Each module contained the following learning activities: rationale, objective, pre-assessment, learning alternatives, post-assessment, and remediation--all designed to help the student acquire and demonstrate a set of competencies. Together, the modules require roughly half of the quarter for completion.

Prior to designing the modules, two research studies for assessing needs were conducted. The first was a survey of 4,000 Utah high school and junior high school students to identify the books read most frequently. A major finding of the study was a substantial drop in independent reading for high school students, in comparison with junior high students in the same geographic areas. For whatever reason, these students were reading considerably less on an independent basis during the high school years. The second study convened groups of secondary teachers, State Department of Education personnel and USU faculty members to identify priority areas for emphasis in teaching reading improvement skills to secondary teachers. The findings of this study were incorporated into the course redevelopment as the main areas of emphasis for the modules.

Two modules were developed for use in the required class, one dealing with study skills and a second dealing with reading comprehension skills. To test the effectiveness of these modules, during spring quarter 1976 a "pre-test - post-test control group design" (Campbell and Stanley, 1963) was employed. One group of 47 students took the class with the new modules while a second group of the same size took the class using the previous lecture method. Each group received a pre-test based upon the objectives of the module and then later, following the instruction by lecture or module, received an alternative form of the test covering the same objectives but at a greater level of difficulty.

The results of an analysis of covariance statistical test for the first module are shown in Table 3. In this comparison, the results are not signi-

TABLE 3: RESULTS OF ANCOVA
MODULE I: STUDY SKILLS

	Experimental Group (n=47) Mean Scores	Control Group (n=47) Mean Scores
Pre-test	21.42	18.95
Post-test	90.10	90.74

Possible score, each test: 100
F = .126, df 1, 91
Differences not significantly different

ficant, indicating no clear superiority for either approach. This was interpreted as indicating that the new approach taught as well as the previous approach.

The results of the second module, shown in Table 4, indicate clear superiority for the traditional approach. Here the results are significantly different in favor of the previous method. While both methods were

TABLE 4 : RESULTS OF ANCOVA FOR MODULE II: COMPREHENSION SKILLS

	Experimental Group (n=47)	Control Group (n=47)
Pre-test	28.34	14.34
Post-test	88.36	92.57

Possible score, each test: 100

$F = 5.453$; df1, 91 ($F^* = 4.0$, $p < .05$)

Differenced significantly different in favor of the control group

effective in attaining the established criterion levels, clearly, this module needs revision before implementing it on a regular basis in the classroom. Some few clues to likely areas for improvement come from a criteria checklist filled out by those using the module approach. Students noted a lack of opportunities for equivalent practice of the needed skills. Somewhat ironically, the student ratings according to specified criteria were higher for the second than for the first module. Some additional formative evaluation may be needed to make the necessary revisions.

Accounting 561: Accounting Theory

Dr. Larzette Hale of the U.S.U. Accounting Department received two grants from our Division. A mini grant enabled her to conduct a survey study of integration of current professional accounting standards and information into selected undergraduate accounting courses. A subsequent faculty development grant enabled her to completely redesign her Accounting Theory course. The following is a statement of her basic thesis and a description of the survey she conducted:

> The professional practice of accounting in the United States requires strict adherence to accounting and auditing standards. These standards include the most recent pronouncements of all appropriate boards and commissions. Furthermore, these same current pronouncements and information are included on the CPA Examinations within a year after issuance. Therefore, accounting students need to be aware of, and understand, the current literature in their field. To teach to this need, accounting educators must deliberately plan for and integrate the most current materials into the day-by-day teaching-learning experiences.

When a survey of literature in the accounting field failed to yield any information on the present state of this problem, Dr. Hale began her study of the integration of current professional accounting standards and information into selected undergraduate accounting courses. Beginning with a mini grant, tools were developed to assess the updating of accounting education at the state and local (U.S.U.) level. The first was a questionnaire assessing how teachers in three Utah universities update accounting courses and how they evaluate their efforts.

A second tool was a student questionnaire designed for local use at U.S.U. Part I of the questionnaire assessed student understanding of eighteen general education items. Dr. Hale feels about 2/3 of the students should know about two thirds or 12 of these items before they enter the Accounting Theory course which is based almost exclusively on current material. Her goal is to bring the department faculty awareness to the level at which students entering Theory will know about 3/4 or about 14 of these items. So far the questionnaire has been administered at the beginning of the Accounting Theory course three times. Evidence thus far indicates a growing awareness on the part of students of current pronouncements in the accounting field.

A direct result of the minigrant study was a nationwide study of the same research question, namely, to what extent are current accounting standards, pronouncements and information integrated into undergraduate accounting courses. Her major finding was that an overwhelming majority

(94%) of accounting educators feel that such information should be intergrated into courses to which it is applicable. By contrast, only 13.6% of those sampled believed that a separate course dealing specifically with current accounting literature could be justified at the undergraduate level (Hale, 1976).

As an additional outgrowth of the original minigrant, Dr. Hale revised an accounting theory course, Accounting 561, to reflect the current literature in the field. Integrating these concepts into her course was done extensively and included the production of appropriate slide-tape materials. The course was taught during Winter 1976 with the course partially revised and again in Summer 1976 with the finished product. A comparison of final exam scores was made using analysis of covariance to equate the groups on the basis of end of quarter overall grade point average. The results, shown in Table 5 below, show significant differences (F=11.57;df=1,44) between the two groups in favor of the fully completed products. A comparison between

TABLE 5
FINAL EXAM GRADE POINTS FOR ACCOUNTING 561 COURSE,
USING GPA AS A COVARIATE

	Winter 1976	Summer 1976
N	27	20
Mean GPA	3.08	3.24
Mean Final Exam Score	184.48	210.35**
Adjusted Final Exam Score	185.90	208.52
	F= 11.57 df= 1,44	F**= 7.24, p<.01

**NOTE: This score was adjusted due to the shorter nature of summer quarter and a somewhat abreviated version of the test used, with 200 possible points in Summer compared with 250 possible points on the Winter exam.

the revised method and the original version of the course was not possible because of the completely different content covered in the examinations.

In summary, the original minigrant for survey research led to a faculty development grant to revise the Accounting Theory course. Four specific outcomes were as follows: (1) the original survey results were distributed throughout the state; (2) a second study, funded and conducted nationally, led to an article for publication in a professional journel; (3) other professors in the department are beginning to incorporate current information into their courses as evidenced by higher awareness levels of entering students; and (4) the general accounting theory course has been revised and has been shown to be superior in its final version to the interim version of the course.

IV. RESULTS OF DEPARTMENTAL EFFORTS IN CIVIL ENGINEERING AND WILDLIFE SCIENCE

The departmental stage of the U.S.U. ID model actually extends the faculty development stage of our model to involve consulting entire departments on curriculum redevelopment. The basis for instructional development at a departmental level is a thorough needs assessment, resulting in a prioritized set of needs for course development. We are now using a model developed and evaluated by a member of our staff (Eastmond, 1975 a and b). The needs assessment process overcomes some of the problems inherent in Stage IV by allowing the developers to work within the goals of the department. The consultant acts as a process person who attempts to task-orient the redevelopment effort. In this stage, not only can more resources be focused on a problem, but a more systematic approach to a solution is possible because more affected subsystems are open to be investigated and revised.

The two departments involved to date have been Civil Engineering and Wildlife Science, the former beginning a year prior to the latter. Included with the results for Civil Engineering are those for Fluid Mechanics, one of the original faculty development grants given by the ID office, and a "spinoff" into Mechanical Engineering which was an outgrowth of the Civil Engineering effort. Only one course is available for reporting from Wildlife Science, although others are being developed and evaluated at this time.

Civil Engineering 350: Fluid Mechanics

One of the earliest and most dramatic evaluations of a course was that done in 1973 by Cheryl Whitlaw, a graduate student, comparing two

approaches to teaching the Fluid Mechanics course. Dr. Gordon Flammer had developed a self-paced approach to teaching the course under a released-time grant from the Instructional Development Division. This evaluation, conducted by the professor and graduate student, compared student achievement and attitudes under the self-paced approach vs. the lecture method of teaching the class.

The design was essentially a pretest-posttest control group design (Campbell and Stanley, 1963), except that assignment to groups was not done on a completely random basis. Two sections of the course were taught. A class beginning at 7:30 A.M. three times per week was given the self-paced version of the course. A second class taught at 10:30 A.M. employed the traditional lecture method. To insure the equivalence of the two groups for comparison, both a pretest of achievement and a measure of motivation were given and analyzed separately for the two classes. The conclusion, based on the observed similarity of the two groups, was that they were statistically comparable.

Following course completion, two final examinations were given to all students, one open-book focusing on problem solving skills and one closed-book focusing mainly upon concept learning. Two versions of each test were assigned randomly to students. In addition, student were asked to report time spent in doing work for the course.

Results

The result of the final exams for the two groups are shown in Table 6. The findings for the openbook section showed no significant differences between the self-paced and lecture portions of the course. However, for the closed book test, there were major differences between the results

TABLE 6:

COMPARISON OF MEAN SCORES FOR THE CE 350 FINAL EXAMINATIONS

	Mean Score (Percentage)		
	Lecture Section (N=24)	Self-paced Section (N=27)	t-value
Open Book Test			
Form 1	80	74	-1.32
Form 2	74	78	0.78
Closed Book Test			
Form 1	46	81	8.56
Form 2	55	77	3.09

* Significant at P<.01 level

of the two groups for the closed book test. This finding was interpreted to mean that students learned problem-solving skills equally well under both systems, but learned the essential concepts of the course better under the self-paced method.

An additional finding is that students report spending more time under the self-paced than under the lecture method. Students in the self-paced class report spending an average of 123 hours, as opposed to 114 hours for the lecture class students.

Critique:

Some concern for the comparability of the two groups is in order. It is likely that a different type of student will sign up for a 7:30 class than will be found in one during mid-morning. Of course, meeting the schedules imposed by other courses will act as an additional factor.

An additional concern was that students under the self-paced method took the final when they completed the work, some as much as one month

after the quarter's end. The possibility of collaboration with classmates, even given the use of alternative test forms, is a very real concern.

Manufacturing Engineering 415, 416
Materials Science

Revisions to this course, taught by Professor Karl Somers, centered around a series of 25 slide-tape units. These self-instructional units were made available to students during lab time and after hours through A-V Services in the Library. The major benefits of this approach have been (1) freeing up instructor time to work with individual students; and (2) clarifying the demonstrations of complex equipment operation.

The evaluation included measures of both student achievement and student attitudes. Achievement was measured at three points in time: (1) prior to the course revision, Spring 1975; (2) during Fall 1975, when modules were complete with a temporary sound track; and (3) during Spring 1976, when the course was essentially complete.

Achievement. The class in Manufacturing Engineering 462 is taught twice per year, during spring and fall quarters. Because of the lack of experimental control over students enrolling in the class, "a non-equivalent control group design" (Campbell and Stanley, 1963, pp. 47-50) was used. Scores on the final test under the previous method of teaching--lecture/demonstration--were compared with alternative form test scores under two quarters of the new approach. The groups were equated statistically using analysis of covariance (ANCOVA) with grade point average (GPA) as the covariate. Comparisons of the three quarters' scores showed significant differences ($F=2.54$, $df=2,41$, $p.<.10$) in favor of the two experimental groups. The results are summarized in Table 7.

TABLE 7: MEAN SCORES FOR THREE GROUPS OF ME 462 STUDENTS

	Number of Students	Mean G.P.A.	Mean Score on Final	Standard Deviation On Final
Spring Quarter 1975 Previous method	14	2.73	72.93	10.34
Fall Quarter 1975 Previous Method	21	2.86	80.10	9.99
Spring Quarter 1976 Experimental Method	10	3.14	83.80	8.61

From the findings, some trends in achievement may be appearing. One of these is that the mean G.P.A. of students enrolled seems to be rising. If "grade inflation" can be discounted, it would appear that students of high academic ability are enrolling in the class. The mean score on the final has gone up considerably, and even with an adjustment for higher entering G.P.A., students under the new method are scoring significantly higher than under the previous method. The decreasing standard deviation indicates a fairly sizeable reduction in the spread of scores, i.e. students are scoring more consistently, with less variation. While further research could verify these apparent trends, each of these findings would argue for superiority of the new method over the old one.

Attitudes. Two survey instruments were used to assess student attitudes toward the course, both given during fall quarter 1975. While the major purpose of the survey was for student feedback during course development, a number of the questions can be applied in a summative sense to document project accomplishment.

For example, Table 8 shows seven statements with high agreement in a favorable direction among students.

TABLE 8 : RESULTS OF THE ME 462 ATTITUDE SURVEY, FALL QUARTER 1975 (n=20)

		Percent of N Answering Favorably*
1.	I think the worksheet questions in the lab manual were generally clear	85
3.	I like being able to repeat a slide/tape module by myself if I need to.	90
6.	Subject material was organized in a way that seemed logical to me.	85
13.	I found that the factual information given in the slide/tape modules was both accurate and useful in the lab.	95
14.	I felt I had enough personal contact with the instructor.	85
15.	I felt that the lab experience was necessary to completely understand the course.	95
20.	Important ideas were easily recognized in most slide/tape modules.	80

*Favorable responses would include "Strongly Agree" or "Moderately Agree" for a positive statement, and "Strongly Disagree" or "Moderately Disagree" for a negative statement.

Students apparently liked the factual content of the course, its clarity and organization, as well as the close contact with the instructor.

Concerning responses unfavorable to the course, on only one item (#7) did more than 25 percent answer unfavorably. This item stated, "Some portions of the slide/tape presentations raised questions which were not answered in the lab," and unfavorable response was interpreted as agreement (70%) with the statement. This particular item could also be viewed as stimulating curiosity and thus may not be particularly unfavorable to the aims of the course. At any rate, during revision particular attention was paid to clarifying unanswered questions.

It should be noted that these strongly positive findings were obtained concerning the field test version of the presentation, before the professional sound script. While further measuring of student affect has not been attempted, it would likely be as favorable or more favorable toward the revised, completed slide/tape modules.

Civil Engineering 430 and 531

Soil Mechanics

A revision of the Soil Mechanics sequence of courses taught to senior Civil Engineering students required the combined efforts of three professors: Drs. Anderson, Dunn and Kiefer. The medium chosen was essentially a textbook format, supplemented with overhead transparencies and realia as appropriate. The revised course was taught for the first time during fall quarter 1975. Indicators used for the evaluation include (1) instructor's perceptions; (2) questionnaire results; and (3) enrollment data.

The perceptions of the course instructor, Dr. Irving Dunn, suggest that certain changes in the course were discernable. One was instructor enthusiasm, which Dr. Dunn reports runs in 5 year cycles, with each course revision. His own enthusiasm was high for the new approach. After examining tests from previous years, Dr. Dunn concluded that the present grades are higher, but he questions exactly what this means. With the change in tests and the change in patterns of grading, it was virtually impossible to make a valid comparison, he felt. The quality of student discussions had remained the same, he believed, with insightful comments from the capable students and the regular complaints from the regular complainers, the less able students.

Enrollment data shown in Table 9 indicate a doubling of the percentage of students who continue in the Soil Mechanics sequence beyond the required course since the introduction of the new approach. The percentage of students

continuing in the optional course increased from an average of 47 percent in the previous three years to 83 percent during 1976.

TABLE 9:

STUDENT ENROLLMENT AND PERCENT CONTINUING IN SENIOR LEVEL SOIL MECHANICS SEQUENCE

	Year			
	1973	1974	1975	1976
Enrollment in CE 531 (required)	38	34	35	24
Enrollment in CE 532 (required for some, optional for others)	17	18	15	20
Percent Continuing	45	53	43	83*

*The 1976 school year was the first in which the revised materials were used.

A student questionnaire given at the completion of the fall 1975 course gave some indication of student sentiment toward the course. Students responded favorably toward the style of teaching, the logic and illustrations in the text, and the use of visual materials in the presentation. Formative feedback from the same questionnaire suggested some areas for improvement in future course revision in the areas of providing sufficient examples, maintaining the logic of the argument, and presenting excessive information on the transparencies. Revision of the course has been conducted over a one year period, and the new format is presently receiving its second trial run.

Wildlife Science 390: Game Birds and Mammals

The Wildlife Science Department became the second thrust for ID efforts. Following an extensive assessment of educational needs (Eastmond 1975), the

undergraduate course "WLS 390: Game Birds and Mammals" was selected for revision. Rather than granting release time to a faculty member, a post-doctoral fellow, Dr. Fritz Knopf, contracted to act as an intermediary between the ID Center and the departmental professor, Dr. Michael Wolfe. The major development activities were handled by Dr. Knopf and an ID graduate student; Dr. Wolfe and ID staff members were brought in as needed. An individualized instruction program was developed for the portion of the course dealing with upland and other game birds. The instructional package, consisting of a 33 page booklet was designed to be used with an accompanying textbook by P.A. Johnsgard, North American Game Birds of Upland and Shoreline. For each unit, a rationale statement, a performance objective, and a worksheet were presented in the instruction package; for detailed information needed to complete the work, the student referred to the text by Johnsgard. Written material was supplemented by color slides available in the Audio Visual Center of the Merrill Library.

During winter quarter, 1976, as a pilot test of the new approach, students in WLS 390 received a lecture presentation from John Ratti, Teaching Assistant, for the first three weeks of the course. Following the first mid-term, students were presented with the experimental instruction packets, instructed in their use, and then given the next three weeks, on their own, to complete them. During that time period no formal classes were held. At the end of the three weeks, a mid-term examination was given covering material taken directly from the modules, along with a student opinion questionnaire. The remainder of the course was taught in similar fashion to the first three weeks, using lecture presentation. A similar modular approach is being developed for this portion of the course.

Methods of Comparison

This evaluation compared the results of the questionnaire and mid-term examinations. In doing so, the following considerations must be kept in mind: (1) the questionnaire was administered only once, with students asked to compare their experiences under the two approaches; (2) the two mid-term examinations covered different material, and while judged by the course instructors to be of similar difficulty, they represented tests of different content areas.

Some useful conclusions can be drawn from the data available.

Results

The form of comparison for the mid-term exams used the experimental subjects as their own controls, i.e. the same subjects were used under both experimental and control conditions. Table 10 summarizes the results of the two mid-term exams. Both had a possible 100 point maximum.

TABLE 10:

A COMPARISON OF MID-TERM TEST MEANS TAUGHT UNDER TWO METHODS OF INSTRUCTION

	Lecture Presentation	Individualized Presentation
Number of students (n)	52	49
Mean Test scores (x)	86.7	93.9
Standard Deviation	11.5	8.0

Given the equal difficulty of tests, the data suggest that the new method of presentation is at least as satisfactory as the previous lecture method. The differences between the correlated means are significant $t=4.86$, $df=47$, $p<.05$) in favor of the experimental presentation.

Items from the student critique form were scored separately on a seven point scale, from strongly agree to strongly disagree, with 4 as a "neutral" response position. No attempt was made to compute a score combining all items. Where items were phrased unfavorably toward the program, scoring was done in the opposite direction (shown in parentheses for those items). Thus, the higher the score on a particular item, the more favorable the student opinion expressed.

The following item means fall at least one point away from the neutral position and can be taken as expressive of favorable opinion toward the class:

		Item Mean
1.	The performance objectives written in the instructional packages are generally clear.	6.48
2.	There were times when I was not clear about what was expected from the unit. (Scored in the opposite direction).	5.65
9.	While recognizing that the technical quality of a number of slides could be improved, I do feel that the important information could be obtained from them.	5.21
11.	I felt that the blue module booklet was a significant addition to the course.	5.75
12.	The page layout in the taxonomy sections was helpful for memorizing.	5.54
13.	I thought the test questions for the three-week package covered material I had seen before.	6.04

These would seem to be encouraging findings. Students feel that the objectives are clear, that the slides and the module booklet are significant improvements in the course, that the page layout aids in memorizing, and that the test questions covered previously learned material.

Some clues to additional areas for improvement were given in the items where student opinion was less favorable toward the present course revision.

The following items should be viewed in this manner.

4. Making this course 3 credit hours would be a step in the right direction. 5.29

8. In the future, we anticipate having either a professor or T.A. available one hour weekly for answering any questions you may have. Concerning this arrangement,

   a. I think I would probably take advantage of this weekly contact if it were made optional to students 5.48

   b. I think this type of arrangement would improve this aspect of the course by adding the "human element". 5.40

14. Some questions requiring a bit more interpretation and use of the knowledge gained should be included. 6.08

Students favor having this course carry three credit hours. They would like to have an instructor available to answer questions, and they would prefer more test items involving integration of the knowledge obtained. To the suggestion of adding a fish section to the course or having a separate fish course, the responses were fairly ambivalent.

In conclusion, the course revision to this point has been perceived favorably by students, and there have been no indications that learning suffered. Certain improvements, involving raising the number of credit hours given, increasing student-instructor contact, and requiring more integration of knowledge on the test questions are viewed favorably by the students.

CONCLUSIONS

The complexities of evaluating projects as diverse as these are sometimes overwhelming. Reported herein are a series of projects where evidence regarding student achievement or student attitudes was available, over a time span of some four years. The sample of minigrants is necessarily small--three out of more than one hundred given--because the recipients of small grants are neither asked nor expected to produce such data. The minigrants included are fairly atypical of others conducted, in each case being considerably more extensive. The faculty development grants described cover roughly one third of the total given--nine out of twenty-seven completed to date. While a more complete coverage of all projects with extensive evaluation would have been desirable, such an approach has not been feasible given the manpower available, and in many cases runs counter to the prevailing philosophy of this center. To be effective, evaluation must be something planned jointly with the faculty client and carried out to meet his specific needs. When the client balks or views this activity as an imposition, the evaluator is obligated to back off and take a new approach. If no satisfactory new approach can be found, the evaluation must simply take a lower priority position on the agenda. In no case will a client be hounded simply to provide data for the ID office purposes. The client's good feelings about his own project, and the good will of both parties, are simply of greater importance.

The finding most significant from this survey of projects is that the redesign and development of courses can work, that this process has been demonstrated effective to a greater or lesser extent for a number of projects undertaken by this office. The variety of these projects is considerable,

but the finding--with some few exceptions--is that student achievement can be boosted or student attitudes toward the material can be improved or both through the use of faculty initiated instructional development. While none of the reported experimental designs are flawless and few of the projects show gains as striking as an evaluator would prefer, there is still a solid body of findings suggesting that modest attempts at involving professors in the redesign of their own courses can have substantial impact upon students. And that is what instructional development is all about. The results reported herein, multiplied by many students over a number of quarters, has a potentially sizeable impact. So there is something different, and that difference can be measured in students.

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